

First record of the false violin spider of the family Drymusidae (Araneae, Synspermiata, Scytodoidea) from Venezuela, with the description of a new species

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Abstract

Drymusa huberi **sp. nov.** is described and illustrated, based on both sexes with specimens collected in a tropical dry forest in Yaracuy State, Venezuela. This new species constitutes the first record of the family Drymusidae for this Neotropical country and fills the distribution gap of the family in the north of South America. Furthermore, we provide the first identification key for all species of *Drymusa* Simon, 1892.

Key Words

Araneae, biodiversity, Neotropics, taxonomy, tropical dry forest

Introduction

Members of the family Drymusidae are popularly known as false violin spiders due to their external resemblance to the brown spiders (Labarque et al. 2018), also known as violin or recluse spiders, which are species of medical importance of the genus *Loxosceles* Heineken & Lowe, 1832 (Sicariidae). Nonetheless, this resemblance is superficial since recent morphological and molecular studies have revealed that Drymusidae is closely related to the Australian family Periegopidae, both belonging to the Scytodoidea superfamily, which includes Sicariidae and other families (Labarque et al. 2018; Magalhaes et al. 2022). Drymusidae comprises two genera: the African *Izithunzi* Labarque, Pérez-González & Griswold, 2018 with five species and the Neotropical *Drymusa* Simon, 1892 with 12 species (Labarque et al. 2018; World Spider Catalog 2023). In

America, seven species are known from the mainland of South America (Argentina, Brazil and Chile), four species from Caribbean islands (Cuba, Hispaniola and St. Vincent) and one from Central America (Costa Rica) (World Spider Catalog 2023). In this paper, we record the family Drymusidae from Venezuela for the first time, with the description of a new species from Yaracuy State.

Materials and methods

The material examined is deposited in the Museo del Instituto de Zoología Agrícola, Maracay, Venezuela (MIZA, curator: Quintín Arias Celis). Images at different focal planes were taken using an Amscope MU500 camera coupled to an Amscope B660B microscope and then assembled with Helicon Focus 6.7.1, a stacking software

(RRID:SCR_014462). Measurements were taken with an ocular reticle and are given in millimetres (mm). Leg measurements are noted as total length (femur, patella, tibia, metatarsus, tarsus). The colour description refers to specimens preserved in ethanol at 85%. The female genitalia were excised with fine forceps, cleaned and cleared with clove oil. The description format mostly follows Rheims et al. (2008) and Labarque et al. (2018). The map was made using ArcGIS 10.1 software by ESRI (RRID:SCR_011081).

The key figures (Figs 21–48) are based on the original illustrations of the species. Figs 21, 22, 39 were modified from Valerio (1971); Figs 23, 30, 32, 42, 46, 47 from Bonaldo et al. (2006); Figs 25, 26 from Alayón (1981); Figs 27, 28 from Labarque and Ramírez (2007a); Figs 29, 43 from Brescovit et al. (2004); Figs 31, 33, 34 from Labarque and Ramírez (2007b); Figs 35, 36 from Goloboff and Ramírez (1992); Figs 37, 38, 44, 45 from Rheims et al. (2008); Figs 40, 41, 48 from Magalhaes et al. (2022).

Abbreviations: **AL**E—anterior lateral eyes, **E**—embolus, **ep**—epigastric plate, **F**—fundus, **Fm**—femur, **Ho**—hood of the post-epigastric plate, **PLE**—posterior

lateral eyes, **PME**—posterior median eyes, **pp**—post-epigastric plate, **Pt**—patella, **S**—spermathecae, **Sd**—Sperm duct, **Ss**—Spermathecae stalk, **Ta**—tarsus, **Ti**—tibia.

Results

Systematics

Family Drymusidae Simon, 1893

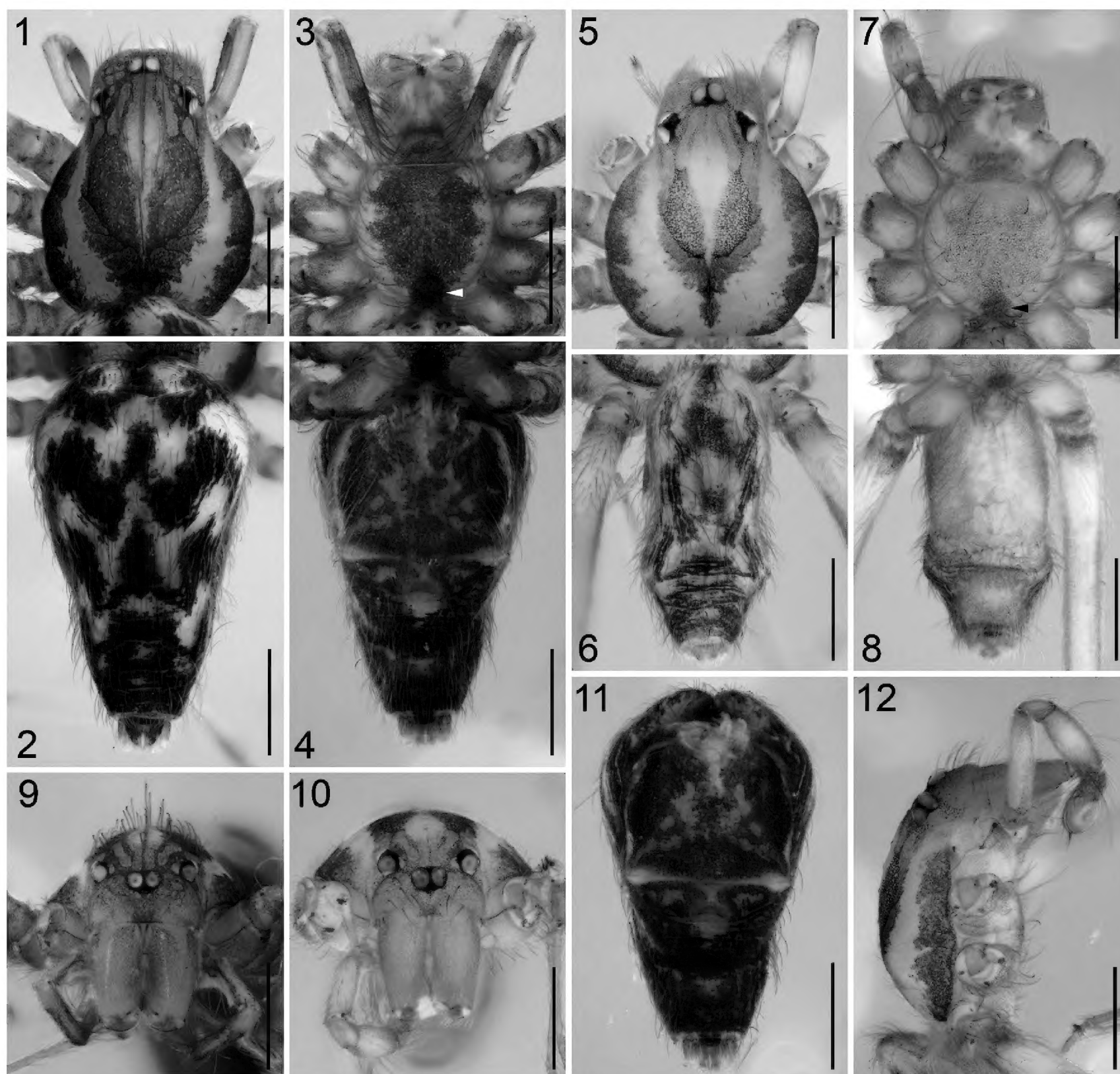
Genus *Drymusa* Simon, 1891

Drymusa huberi sp. nov.

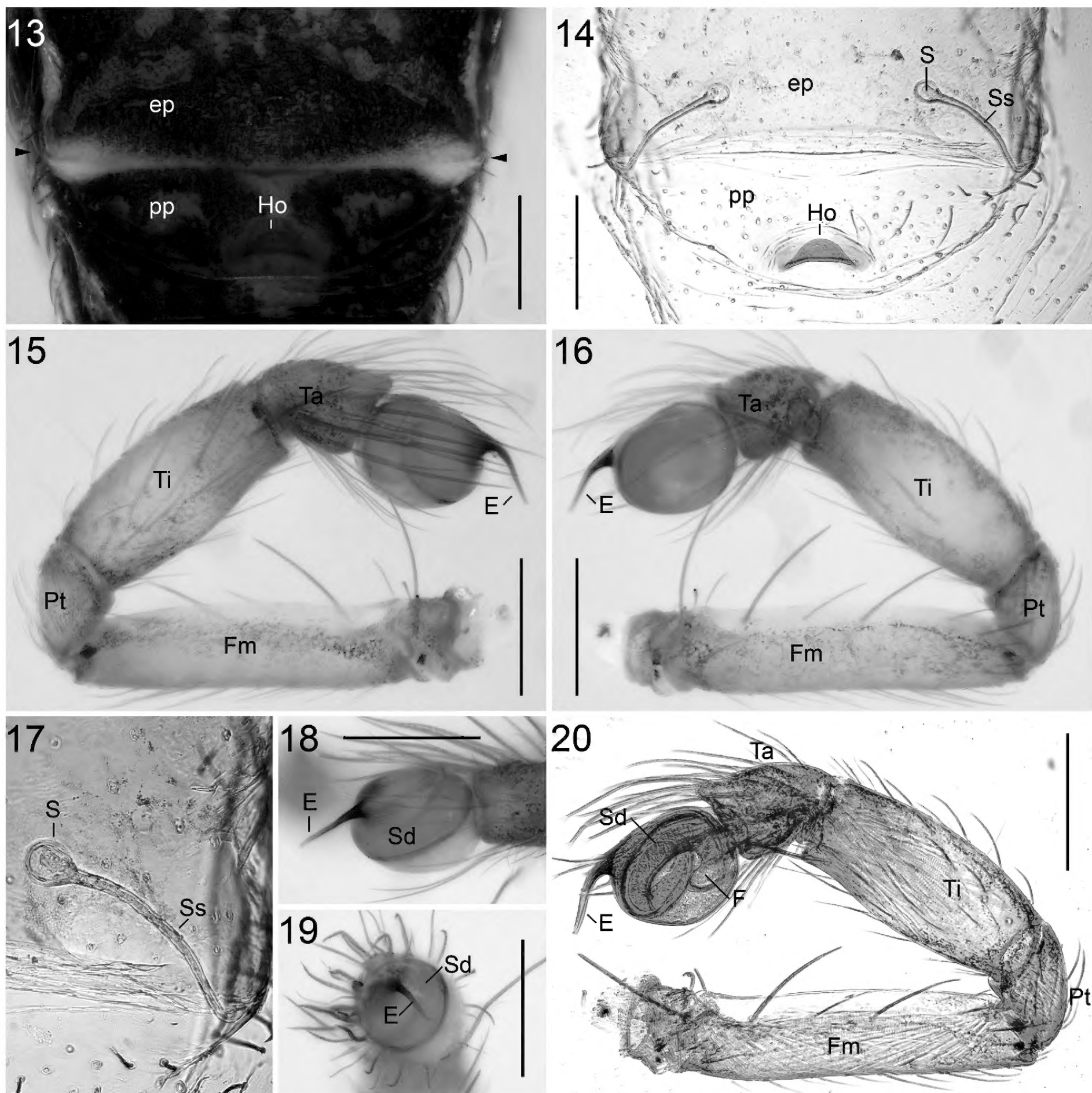
<https://zoobank.org/32F46572-64B6-40C6-94E8-5126B59DA6BC>

Figs 1–20, 24, 49, 50

Type data. VENEZUELA • ♀ **holotype**: MIZA0105853; Yaracuy, La Guáquira; 10.2951°N, 68.6535°W; 120 m a.s.l.; 16 Feb 2020; O. Villarreal, B.A. Huber, Q. Arias C. leg.; forest along stream • **Paratype**: 1 ♂ same data as the holotype.



Figures 1–12. *Drymusa huberi* sp. nov., female holotype (1–4, 9, 11) and male paratype (5–8, 10, 12). 1, 5. Prosoma, dorsal view; 3, 7. Same, ventral view; 2, 6. Opisthosoma, dorsal view; 4, 8, 11 Same, ventral view (11 depilated); 9, 10. Prosoma, frontal view; 12. Same, lateral view. Scale bars: 0.5 mm (1–12).



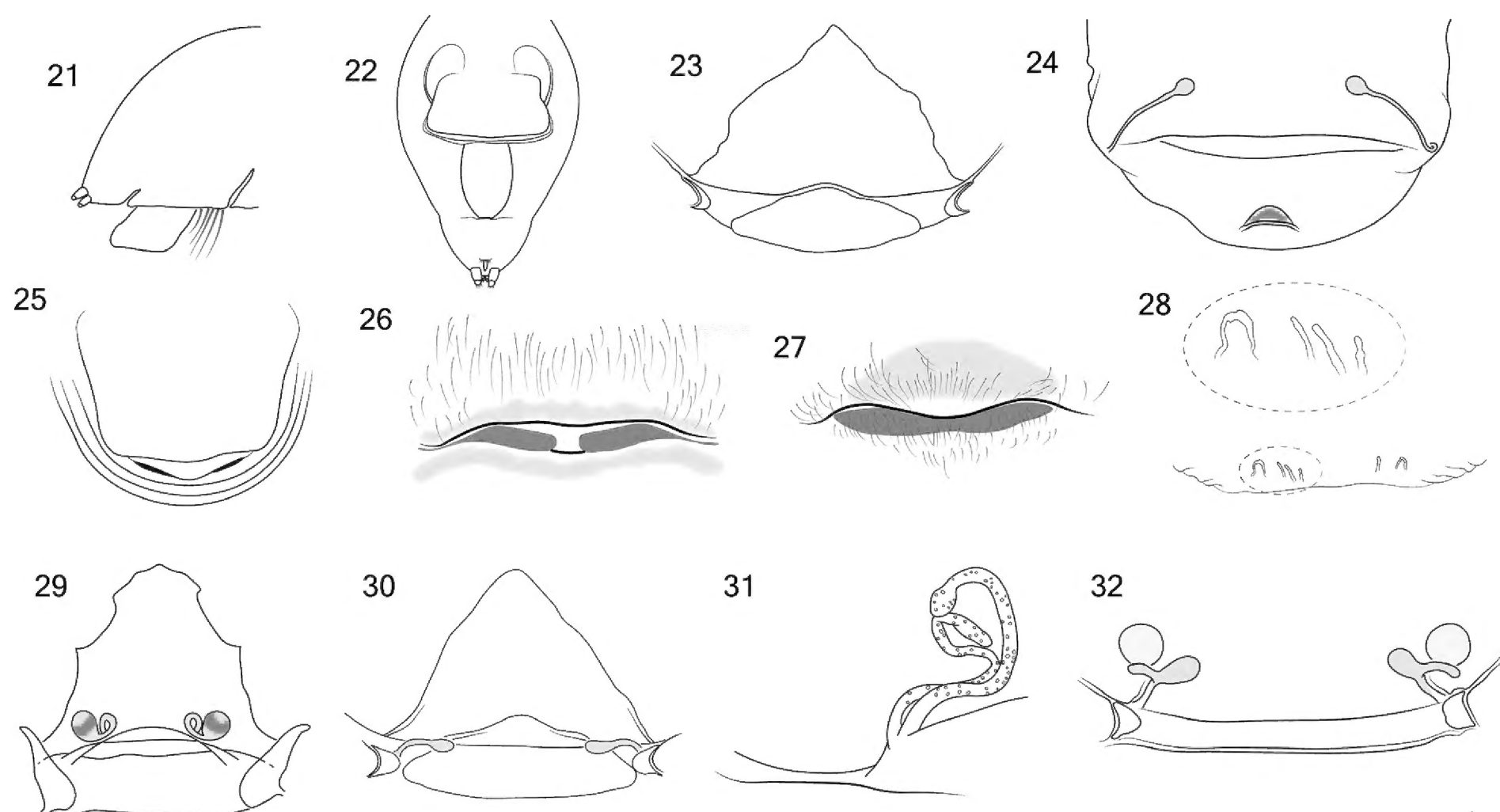
Figures 13–20. *Drymusa huberi* sp. nov. **13.** Female genitalia, ventral view; **14.** Same (cleared), dorsal view; **15.** Male palp, prolateral view; **16, 20.** Same, ventral view (**20** cleared); **17.** Detail of vulva (cleared), dorsal view; **18.** Male palpal bulb, apical view; **19.** Same, ventral view. Scale bars: 0.2 mm (**13–16, 18–20**). Abbreviations: E—embolus, ep—epigastric plate, F—fundus, Fm—femur, Ho—hood of the post-epigastric plate, pp—post-epigastric plate, Pt—patella, S—spermathecae, Sd—Sperm duct, Ss—Spermatheca stalk, Ta—tarsus, Ti—tibia.

Etymology. The specific epithet is a name in apposition to honour the arachnologist Bernhard A. Huber in recognition of his prolific and excellent contributions to the taxonomy and systematics of the pholcid spiders of Venezuela and the world. Bernhard was also one of the collectors of the type specimens.

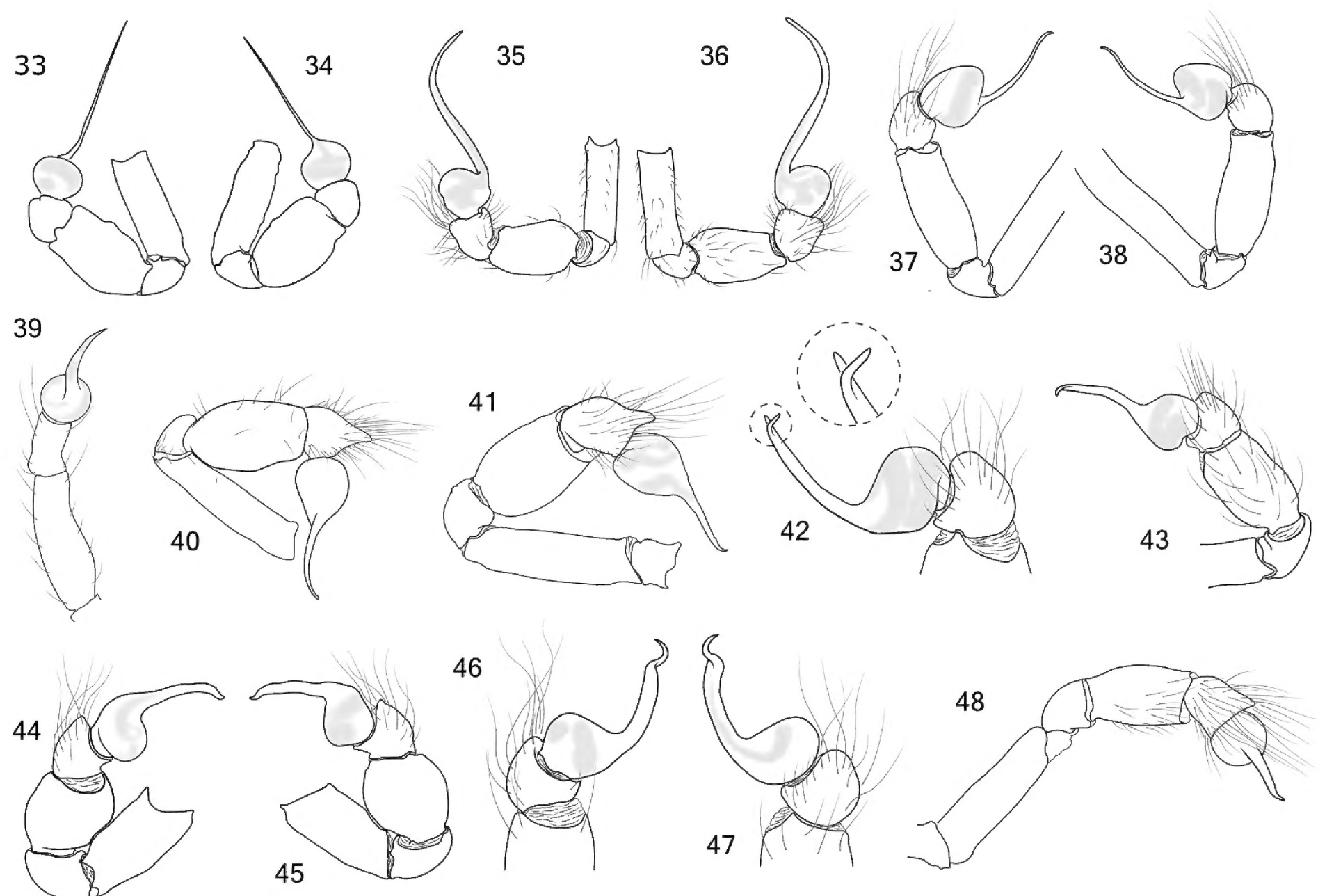
Diagnosis. The vulva of *D. huberi* sp. nov. resembles those of *D. canhemabae* Brescovit, Bonaldo & Rheims, 2004 and *D. colligata* Bonaldo, Rheims & Brescovit, 2006 by the unbranched, long spermathecae (Figs 14, 17). They differ by the spermathecae with a long stalk that is not coiled and the distal part globular (Figs 14, 17), whereas *D. canhemabae* has coiled spermathecae (see Brescovit

et al. (2004): fig. 5; Fig. 29) and *D. colligata* has shorter spermatheca, with its distal part swollen (not globular) (see Bonaldo et al. (2006): fig. 6; Fig. 30). Females of *D. huberi* sp. nov. also resemble those of *D. dinora* Valerio, 1971 by the long and broad epigastric plate, but *D. huberi* sp. nov. has a median hood on the post-epigastric plate, absent in *D. dinora* (see Valerio (1971): figs 8, 9; Fig. 20), *D. canhemabae*, and *D. colligata*. Males of *D. huberi* sp. nov. can be easily distinguished from all congeneric species by having the embolus shorter than the bulb length (Figs 15, 16, 18, 20).

Description. Female (Holotype). Habitus. Carapace pear-shaped, pars cephalica elongated, with many long,



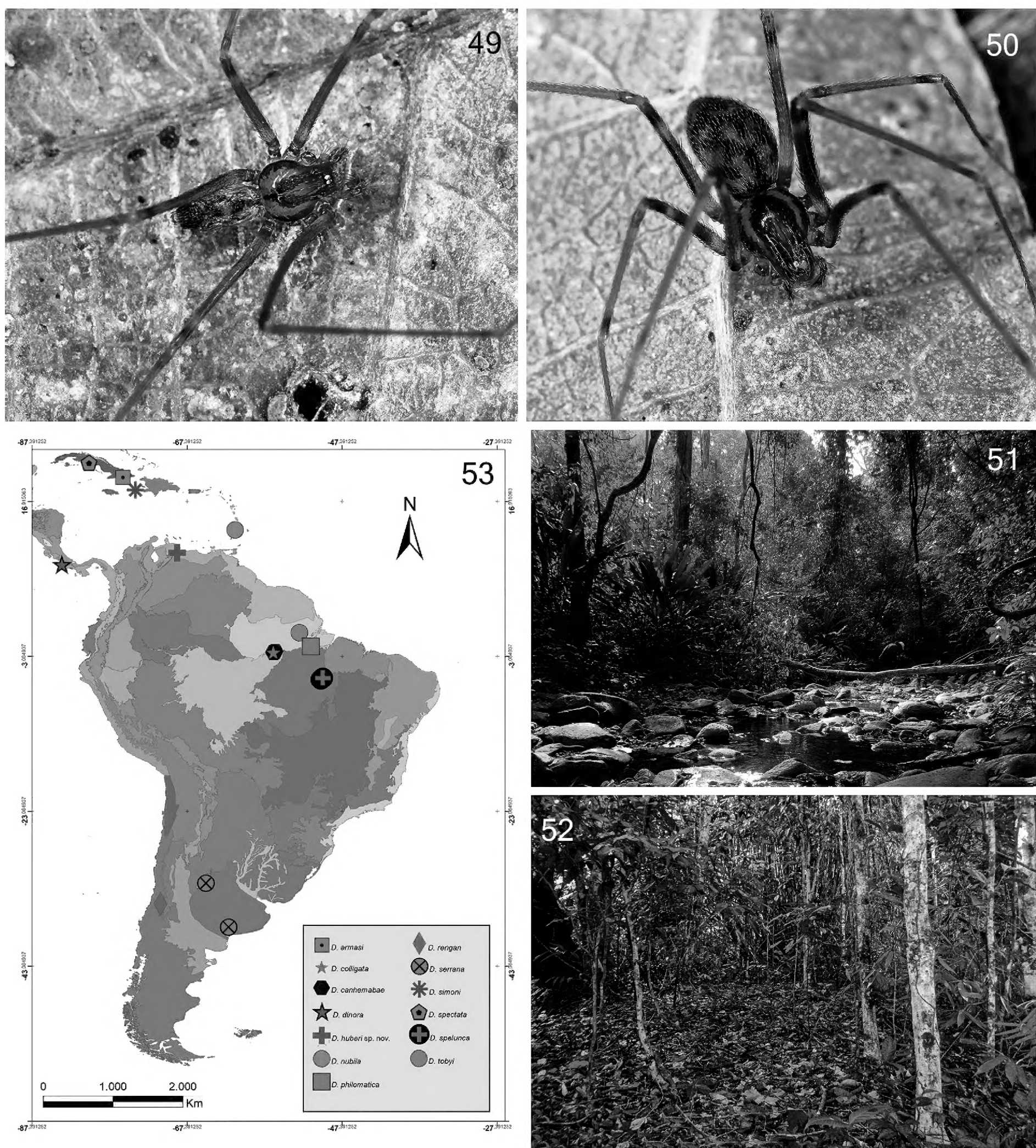
Figures 21–32. *Drymusa* spp., females. **21.** *D. simoni*, posterior part of opisthosoma, lateral view; **22.** *D. dinora*, opisthosoma, ventral view; **23, 25–27.** Female genitalia, ventral view (**23.** *D. colligata*; **25.** *D. spectata*; **26.** *D. armasi*; **27.** *D. serrana*); **24, 28–32.** Same, dorsal view (**24.** *D. huberi* sp. nov.; **28.** *D. serrana*; **29.** *D. canhemabae*; **30.** *D. colligata*; **31.** *D. rengan*; **32.** *D. spelunca*).



Figures 33–48. *Drymusa* spp., male palp (**33, 34.** *D. rengan*; **35, 36.** *D. serrana*; **37, 38.** *D. spelunca*; **39.** *D. dinora*; **40.** *D. armasi*; **41.** *D. spectata*; **42.** *D. tobyi*; **43.** *D. canhemabae*; **44, 45.** *D. colligata*; **46, 47.** *D. philomatica*; **48.** *D. simoni*). **33, 35, 37, 40, 41, 44, 46, 48.** Palp, prolateral view; **34, 36, 38, 39, 42, 43, 45, 47.** Palp, retrolateral view.

procumbent setae (Figs 1, 9). Opisthosoma elongated, with posterior two thirds attenuated and covered sparsely with long, brown setae (Fig. 2). **Colouration.** Carapace yellow-

ish, margins on pars thoracica tinged with purple-brown and a median broad V-shaped pattern; pars cephalica reticulated with purple-brown maculations (Fig. 1). Chelicerae



Figures 49–53. 49, 50. *Drymusa huberi* sp. nov. live specimens from La Guáquira, Yaracuy State, Venezuela. 49. Male, paratype; 50. Female, holotype; 51. Habitat, tropical dry forest in La Guáquira, Yaracuy State; 52. Leaf litter on the forest floor, microhabitat of the species; 53. Known distribution of all species of the genus *Drymusa*. Photo credit: O. Villarreal: 49, 50, 51; D. Romero: 52.

orange, with brownish maculations. Endites and labium purple-brown, the latter darker than the former. Sternum purple-brown, except on lateral margins, which are yellowish, with one darker spot on the posterior margin (arrow in Fig. 3). Palp with femur and patella mostly yellowish, tinged with purple-brown on lateral sides; tibia and tarsus mostly purple-brown. **Legs:** femora mostly purple-brown, with one basal and one distal yellowish ring; patellae mostly purple-brown; tibiae mostly yellowish, with one basal, thin purple-brown ring and one distal purple-brown ring; metatarsi and tarsi yellowish. Dorsum

of prosoma grey-white with three W-shaped dark brown bands, posterior third mostly dark brown (Fig. 2). Venter purple-brown, with pale-yellowish spots on the epigastric area (Fig. 4). **Female genitalia.** Epigastric plate rectangular, large and about half the opisthosoma length (Figs 4, 11); posterior corners are more sclerotised than the plate (arrow in Fig. 13). Post-epigastric plate crescent-shaped, with a small median hood. Vulva with the distal part of spermatheca globular, on long, thin stalks, arising on lateral corners of the epigastric plate (Figs 14, 17). Spermatheca with gland ductules well-spaced on the distal half

(Fig. 17). **Measurements.** Carapace 1.32 long, 1.02 wide; eye diameters: PME 0.10, ALE 0.09, PLE 0.06; labium 0.30 long, 0.30 wide; sternum 0.69 long, 0.65 wide. Legs: I 10.8 (2.82, 0.36, 2.97, 3.06, 0.87), II 8.76 (2.46, 0.34, 2.49, 2.65, 0.82), III 6.87 (1.95, 0.39, 1.74, 2.04, 0.75), IV 8.59 (2.35, 0.33, 2.43, 2.61, 0.87). Leg formula: 1243.

Male (paratype). Habitus as the female (Figs 5–8, 10, 12), except pars cephalic with few short setae, mostly on clypeal area, opisthosoma with posterior third attenuated. **Colouration.** As the female, but the purple-brown median pattern and lateral margins are narrower; the sternum maculation is light purple; palp yellowish with scattered purple-brown maculations, tarsus darker than other segments. Dorsum of opisthosoma with transversal bands narrower, elongated, fused with the next one; venter yellowish, except posterior third, which is light purple. **Palp.** Sub-cylindrical femur longer than tibia; tibia slightly

more thickened than femur and slightly swollen at mid-length (Figs 15, 16, 20). Bulb subspherical, slightly longer than wide (Figs 15, 16, 18). Embolus spiniform, curved, directed ventral-retrolaterally and relatively short, about half the length of bulb (Figs 18, 19). **Measurements.** Carapace 1.26 long, 1.05 wide; eye diameters: PME 0.12, ALE 0.09, PLE 0.07; labium 0.24 long, 0.27 wide; sternum 0.72 long, 0.72 wide. Legs: I missing, II 10.62 (2.97, 0.39, 3.09, 3.24, 0.93), III 7.77 (2.13, 0.36, 2.04, 2.40, 0.84), IV 10.20 (2.82, 0.36, 2.82, 3.09, 0.93). Leg formula: (1)243.

Distribution. Only known from the type locality. See Fig. 53 for the known distribution of all *Drymusa* species.

Natural history. Both specimens were found in the leaf litter in a tropical dry forest along a streambed (Figs 51, 52); this species shares the microhabitat with *Ochyrocera* sp. (Ochyroceratidae). For live specimens of *D. huberi* sp. nov., see Figs 49, 50.

Key to *Drymusa* species

Females of *Drymusa philomatica* Bonaldo, Rheims & Brescovit, 2006 and *D. tobyi* Bonaldo, Rheims & Brescovit, 2006 and male of *D. nubila* Simon, 1892 are unknown. Note: characters used for *D. dinora* and *D. simoni* Bryant, 1948 were modified from Valerio's key (1971).

- | | | |
|-------|---|--|
| 1 | Female | 2 |
| – | Male | 12 |
| 2(1) | Opisthosoma with a chitinous protruding lobe (Fig. 21) just anterior to tracheal slit; metatarsus I with recurved setae | <i>D. simoni</i> |
| – | Opisthosoma without a chitinous protruding lobe; metatarsus I without recurved setae | 3 |
| 3(2) | Epigastric plate long and broad, trapezoid, with posterior corners conspicuous (Figs 11, 13, 22) | 4 |
| – | Epigastric plate absent, if present, relatively small, triangular, with posterior corners inconspicuous (Fig. 23)..... | 6 |
| 4(3) | Median elongated sclerotised ogive-shaped plate on the post-epigastric plate (Fig. 22)..... | <i>D. dinora</i> |
| – | Small, median sclerotised hood of the post-epigastric plate (Fig. 24) or the post-epigastric plate is a transversal strip followed by grooves..... | 5 |
| 5(4) | Median sclerotised hood of the post-epigastric plate; distal part of spermathecae bulbous with stalks long (more than three times the length of the distal part) (Figs 14, 24) | <i>D. huberi</i> sp. nov. |
| – | Presence of a transversal strip, followed by grooves on the post-epigastric region (Fig. 25); spermathecae unknown.... | <i>D. spectata</i> Alayón, 1981 |
| 6(3) | Sclerotised, small fovea associated with the book lung slit..... | <i>D. nubila</i> |
| – | Sclerotised fovea of the book lung slit absent (some species have sclerotised ridges associated with the genitalia, for example, <i>D. canhemabae</i> , <i>D. colligata</i> and <i>D. spelunca</i> (e.g. Figs 23, 29, 30, 32))..... | 7 |
| 7(6) | Epigastric plate with entire or divided median sclerotised imprint | 8 |
| – | Epigastric plate without median sclerotised imprint | 9 |
| 8(7) | Pars cephalica of the carapace with a reticulated pattern of maculations; sclerotised imprint divided (Fig. 26)..... | <i>D. armasi</i> Alayón, 1981 |
| – | Pars cephalica of the carapace without a reticulated pattern; sclerotised median imprint entire (Fig. 27)..... | <i>D. serrana</i> Goloboff & Ramírez, 1992 |
| 9(7) | Carapace with median, V-shaped pattern and lateral bands | 10 |
| – | Carapace colouration otherwise, without lateral bands | 11 |
| 10(9) | Spermathecae stalk coiled (Fig. 29)..... | <i>D. canhemabae</i> |
| – | Spermathecae stalk elongated, not coiled and distal part of spermathecae swollen with short stalks (about the same length as the distal part) (Fig. 30)..... | <i>D. colligata</i> |
| 11(9) | Spermathecae bifid, but with two long stalks slightly expanded distally (Fig. 31).... | <i>D. rengen</i> Labarque & Ramírez, 2007 |
| – | Spermathecae bifid, but with two short stalks greatly expanded distally (one rounded, one oval) (Fig. 32)..... | <i>D. spelunca</i> Bonaldo, Rheims & Brescovit, 2006 |
| 12(1) | Embolus short, about half the length of the palpal bulb and spiniform (Figs 15, 16, 20) | <i>D. huberi</i> sp. nov. |
| – | Embolus longer than the palpal bulb or similar in length, differently shaped than described above..... | 13 |

13(12)	Embolus very long, about three times the length of the copulatory bulb	4
–	Embolus relatively long, about two times the length of the bulb.....	15
14(13)	Palp tarsi with a small apophysis on the promargin; embolus filiform, flexible (Figs 33, 34).....	<i>D. renger</i>
–	Palp tarsi without a small apophysis on the promargin; embolus curved and thick (about one-fifth of bulb width) (Figs 35, 36).....	<i>D. serrana</i>
15(13)	Palpal tibia sub-cylindrical, relatively long (about two times longer than wide) (Figs 37–39)	16
–	Palpal tibia relatively short and thickened at mid-length, slightly longer than wide or as long as wide (Figs 40, 41, 44, 47).....	17
16(15)	Embolus thin and relatively long (Figs 37, 38)	<i>D. spelunca</i>
–	Embolus thick and relatively short (Fig. 39).....	<i>D. dinora</i>
17(15)	Cymbium distally projected (Figs 40, 41).....	18
–	Cymbium distally truncated or rounded, but not projected (Figs 42–48)	19
18(17)	Ratio length/wide of carapace 1.21; distal half of embolus curved (Fig. 40).....	<i>D. armasi</i>
–	Ratio length/wide of carapace 1.35; distal third of embolus curved (Fig. 41)	<i>D. spectata</i>
19(17)	Embolus length about the same length of the bulb (Fig. 48).....	<i>D. simoni</i>
–	Embolus larger than the length of the bulb (Figs 42–47)	20
20(19)	Carapace colouration pattern with median V-shaped pattern, but without lateral bands; apex of embolus bifid (Fig. 42)	<i>D. tobyi</i>
–	Carapace colouration pattern with median V-shaped and lateral bands; apex of embolus otherwise (Figs 43–47)	21
21(20)	Apex of the embolus abruptly narrowed and hook-shaped (Figs 46, 47).....	<i>D. philomatica</i>
–	Apex of the embolus not hook-shaped.....	22
22(21)	Apex of the embolus twisted; palpal tibia slightly longer than wide (Fig. 43)	<i>D. canhemabae</i>
–	Apex of the embolus not twisted; palpal tibia greatly thickened, subglobose (Figs 44, 45)	<i>D. colligata</i>

Discussion

Despite the relatively simple genitalia of males and females of *Drymusa*, the new species have remarkable somatic and genitalic characteristics that allow them to be easily distinguished amongst congeners. For example, there are two geographically close species, the Central American *D. dinora* and Caribbean *D. simoni*, both having relatively short emboli. However, *D. huberi* sp. nov. has a significantly shorter embolus. Therefore, the comparative length of the embolus and the copulatory bulb is useful, as is the comparative width and length of male palpal tibia, which has proven useful for differentiating Brazilian species, such as *D. canhemabae*, *D. colligata* and *D. tobyi*.

In addition, the median hood, of unknown function, on the post-epigastric plate differentiates the female of *D. huberi* sp. nov. amongst geographically close and distant species. Other congeneric species, for example, *D. dinora*, *D. canhemabae* and *D. colligata*, have a secondary chitinised plate (after the epigastric plate), but differ in shape, size and position. The previous character as those other characteristics of male (e.g. the shape of the cymbium) and female (e.g. shape and size of the epigastric plate) must be evaluated in a phylogenetic context.

The known distribution of *D. huberi* sp. nov. fills the distribution gap of the genus in northern South America. However, vast regions that could harbour new species of this genus, particularly in South America, remain unexplored. Finally, no comprehensive morphological or molecular studies have included all known species of *Drymusa*. Therefore, further taxonomic studies are needed to improve our understanding of the genus.

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